

Reference Copy

Information Bulletin

Grade 6 Science
1995-96

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This bulletin contains general information about the Provincial Student Assessment Program and information specific to the Grade 6 Science Achievement Test. **This bulletin replaces all other bulletins.**

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General Information

The Provincial Student Assessment Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

Administering the Assessment

Information about the nature of the provincial assessments as well as their administration to special needs students can be found in the *General Information Bulletin, Provincial Student Assessment Program*, which is mailed to all superintendents and principals in the fall of each year.

Schedule

The written-response component of English and French Language Arts will be administered during the last week of May. The machine-scorable component of all achievement tests will be administered during the last two weeks of June. Specific information regarding scheduling is provided in the current *General Information Bulletin, Provincial Student Assessment Program*.

To minimize any risks to security, we recommend that all students complete the test on the same day. Superintendents approve a local schedule for achievement test administration within the dates provided. Students who are absent when the tests are administered and who return to school by the end of the school year must write the tests upon their return. By scheduling the tests early in the administration period most, if not all, absentees can be tested upon their return to school. The principal is responsible for ensuring the security of the tests.

The tests that will be administered each year are:

Grade 3

English Language Arts (*Part A: Writing and Part B: Reading*)
Mathematics (English and French forms)

Grade 6

English Language Arts (*Part A: Writing and Part B: Reading*)
Français 6^e Année (*Partie A: Production écrite and Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

Grade 9

English Language Arts (*Part A: Writing and Part B: Reading*)
Français 9^e Année (*Partie A: Production écrite and Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

Students in French Immersion Programs

All students in French Immersion programs must write the French form of the achievement tests. Alberta Education will send a checklist to schools by January requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

Marking Achievement Tests Locally

Teachers will be able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year-end assessment, as well as for planning instruction.

Reporting the Results

Each school jurisdiction will receive a district report and individual school reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staffs (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

An individual profile for each student will be sent to the school that the student will attend in September. We also expect that these reports will be shared with parents.

Provincial results for each subject and grade will be made public in September in documents titled *Assessment Highlights*.

Broadened Assessment Initiatives

The Student Evaluation Branch has developed additional instruments to collect a broader base of information about what students know and can do than achievement tests themselves can provide. These instruments will be administered to a provincial sample of students in all subjects on a rotating basis. The following assessments will be given in 1996:

Grade 3

- problem-solving activities in mathematics

Grade 6

- "whole book" performance-based assessment in language arts

Grade 9

- problem-solving activities in mathematics

Description of the Science Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned science by the end of Grade 6. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 6 students in all types of school programs — public, private, and home education.

Purpose of Assessment Standards

The following statements describe what is expected of Grade 6 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 6 Science program. The statements represent the standards against which student achievement will be measured. By comparing actual results with provincial standards, decisions can be made about whether achievement is, in fact, "good enough."

Acceptable Standard

Students who meet the *acceptable standard* of performance in Grade 6 Science are expected to have a sound foundation in the knowledge and skills fundamental to the program and be able to perform routine procedures. They should be able to solve routine problems and apply skills in novel contexts or situations. They are expected to predict from information presented in a diagram. For example, students predict that rivers become more twisted over an extended period of time. They are expected to make observations and be able to make predictions or inferences from those observations. For example, they are expected to make observations of what

happens to light as it is reflected or refracted, and to predict the effect of mirrors and lenses in new applications. Also, students should be able to follow directions to construct devices that help to solve a problem. Students are expected to solve problems when provided with background information and appropriate materials. For example, they should be able to construct a circuit tester and use it to find the connections in a hidden circuit.

Students who meet the *acceptable standard* are expected to apply the basic processes of science and more advanced skills in straightforward tasks. Students should be able to interpret information presented in graphs and tables, and make inferences from information presented in diagram form. They are expected to know about the impact of science and technology on society, and to be able to view an issue from more than one perspective. They are expected to form judgements when provided with information, and to be able to research information to make an informed decision. Students are expected to make judgements about environmental problems and to support their views with relevant information.

Standard of Excellence

Students who meet the *standard of excellence* in Grade 6 Science are expected to have an advanced understanding of the knowledge and skills fundamental to the program, to be able to perform routine procedures with ease, and troubleshoot irregularities in procedures. They should be able to solve complex problems and apply skills in novel contexts or situations. For example, they are expected to design and complete controlled experiments to test the performance of a toy in varied conditions, collect a set of data, and make inferences about the performance of the toy in these conditions. Students are expected to make inferences from observations, and to be able to analyze and interpret data to formulate new hypotheses. For example, they are

expected to be knowledgeable about living things and the environment in their local area and to make observations, inferences, and hypotheses about living things in a variety of other environments. Students are expected to use their knowledge purposefully and confidently. Students are expected to be creative problem-solvers who can construct devices to help solve a problem.

Students who meet the *standard of excellence* are expected to apply the basic processes of science with ease and apply more advanced skills in complex situations. They are expected to exhibit an awareness of, appreciation of, and interest in science as it relates to the environment, themselves, and society. They are expected to be open-minded, persistent problem-solvers and be able to look at a problem from a number of viewpoints. Another expectation is that they know how science and technology affects them personally and are able to examine its societal implications. Also, students should be able to investigate a problem by gathering information from a number of sources—even when information is incomplete or has contradictions—and draw conclusions.

Grade 6 Science Assessment

The Grade 6 Science assessment measures the overall growth in student learning through the elementary science program with particular emphasis on Grade 6.

Two Assessment Forms for 1995–96

For 1995–96 school year, there will be two assessment forms for Science 6. One form reflects the current learning expectations for Grade 6 Science. The second form reflects the new learning expectations being implemented on an optional basis during the 1995–96 school year. Schools will be required to commit to only one form of the assessment. An exception will be made for schools offering instruction in both French and English, in which case, a different

version may be requested for each program. In January, principals will be requested to indicate which form of the assessment will be required for administration in June.

Note: Special provision test forms will only be available for the current science program.

General Description

The assessment instruments (machine-scored) consist of 50 multiple-choice questions* with 20 of the questions common to both forms. Students will record their answers on a separate answer sheet. The assessment is designed to be completed in 60 minutes. However, additional time of up to 30 minutes may be provided to allow students to finish.

Students will need HB pencils, erasers, and scrap paper. Calculators are not required for successful completion of the assessment but are permitted.

Content

The assessment is limited to those areas of learning that may be efficiently assessed using paper and pencil.

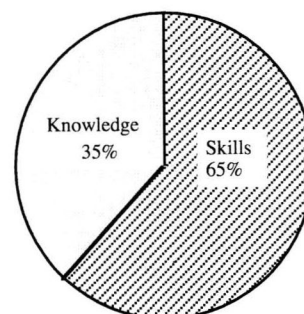
The learning components, knowledge and skills, are integrated in the assessment.

Blueprints

The emphasis for the assessment instrument based on the current learning expectations is presented in the blueprint.

Topic	Number of Questions (Percent)	Learning Components Emphasis Number of Questions (Percent)	
		Knowledge	Skills
1. Matter and Energy	22 (44)	7 (14)	15 (30)
2. Living Things and Environment	18 (36)	6 (12)	12 (24)
3. Earth, Space, and Time	10 (20)	3 (6)	7 (14)
Total	50 (100)	16 (32)	34 (68)

Knowledge is the fundamental understanding of concepts and processes of science. The skills component refers to the application of knowledge. The following circle graph shows the approximate emphasis for knowledge and skills.



Questions for the assessment based on the current expectations for Grade 6 Science will have the context drawn from:

1. Matter and Energy
2. Living Things and Environment
3. Earth, Space, and Time

Questions for the assessment based on the new learning expectations being implemented on an optional basis will have the context drawn from:

1. Air and Aerodynamics
2. Flight
3. Sky Science
4. Evidence and Investigations
5. Trees and Forest

The emphasis for the assessment instrument based on the new learning expectations being implemented on an optional basis is presented in this interim blueprint.

Expectations	Number of Questions (Percent)	Learning Components Number of Questions (Percent)	
		Knowledge	Skills
Students will be expected to:			
Work cooperatively with others to design and carry out an investigation in which variables are identified and controlled; and recognize the importance of accuracy in observation and measurement, and apply suitable methods to record, compile, interpret, and evaluate observations and measurements gathered by self and group; and work cooperatively with others in designing and carrying out an investigation of a practical problem and in developing a possible solution	14 (28%)	2 (4%)	12 (24%)
Describe properties of air and the interactions of air with objects in flight, construct devices that move through air, and identify adaptations for controlling flight	14 (28%)	9 (18%)	5 (10%)
Observe, describe, and interpret the movement of objects in the sky, and identify pattern and order in these movements	7 (14%)	4 (8%)	3 (6%)
Apply observation and inference skills to recognize and interpret patterns, to distinguish a specific pattern from among a group of similar patterns, and apply a knowledge of the properties and interactions of materials to the investigation and identification of a material sample	6 (12%)		6 (12%)
Describe characteristics of trees and the interaction of trees with other living things in the local environment	9 (18%)	5 (10%)	4 (8%)
Total	50 (100%)	20 (40%)	30 (60%)

Note: Some contexts may also be drawn from learnings accumulated through grades 4, 5, and 6.

Confirming Standards

Confirming standards is a process whereby judgements about students' performance on the assessment are made in relation to provincial standards. For more information on confirming standards procedures, refer to Appendix A of the *Provincial Student Assessment Program Provincial Report, June 1993 Administration*. For information on the selection of teachers for participation in the confirming standards process, refer to the *General Information Bulletin, Provincial Student Assessment Program*.

Preparing Students for the Assessment

I strongly advocate preparing children to understand tests and testing through extensive class discussion about the makeup of the test and how to take it, and then adequate practice to find out their own particular weaknesses in approaching tests.

—Graves, p. 183

We hope that teachers will share the following information with their students to help them prepare for the Grade 6 Science Achievement Assessment.

- Talk with your students about some of the positive and negative aspects of taking tests. Share some of your own experiences and have your students share theirs.
- Familiarize your students with the format of the achievement assessment and the kinds of questions that will appear on it by having them work through the sample questions.

Suggestions for Answering Multiple-Choice Questions

- The questions in the achievement assessment are integrated in narrative themes.
- Frequently, a number of questions are clustered around a common context.
- Students should use other information given for answering questions by:
 - a. reading the information and thinking carefully about it before trying to answer any of the questions that need the information; or
 - b. reading the questions first and then reading the information, keeping in mind the questions they need to answer.
- When information is given for more than one question, students should go back to the information before answering each question.
- Students must make sure they look at all forms of information given. Information may be given in words, charts, pictures, graphs, and maps.
- Students should choose the answer they think is best. If they don't see a correct or best answer right away, they are encouraged to find the two choices that seem closest to the correct answer and pick one of them for the answer.

Sample Questions

Familiarize your students with the format of the machine-scored component of the assessment and the kinds of questions that will appear on it by having them work through the sample questions.

Establish an environment suitable for test taking, and allow students to complete the assessment example.

On the following pages, sample questions are presented that reflect the nature of questions that will appear on the Science Assessment. These sample questions have been used on previous science achievement tests and may be used with students. Other items from previous tests remain secured (see *General Information Bulletin*).

When the sample questions are completed and marked, discuss with the class the time needed to do the work and the accuracy of the work, and address any specific concerns raised by students.

Use the following information to answer question 1.

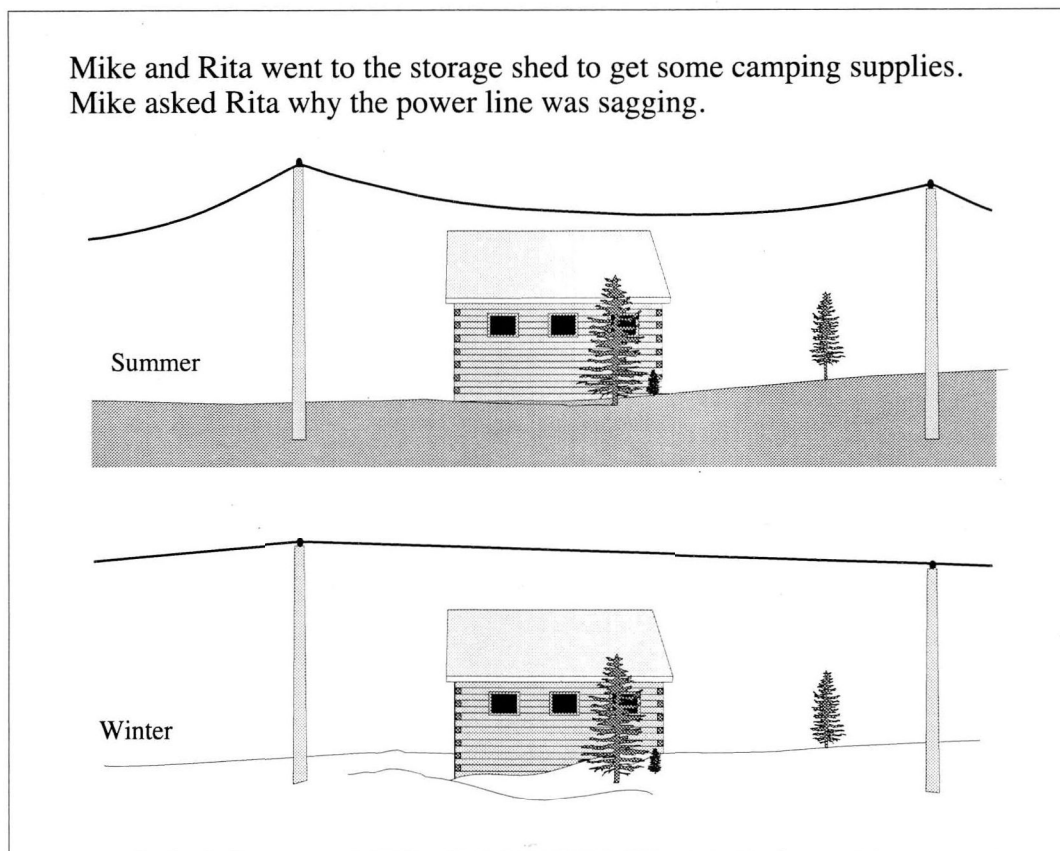
On his way to his grandfather's farm, Mike passed this farm.



1. Mike realized that a living thing that can produce its own food is the
 - A. sheep
 - B. bird
 - C. horse
 - D. grass

Use the following information to answer question 2.

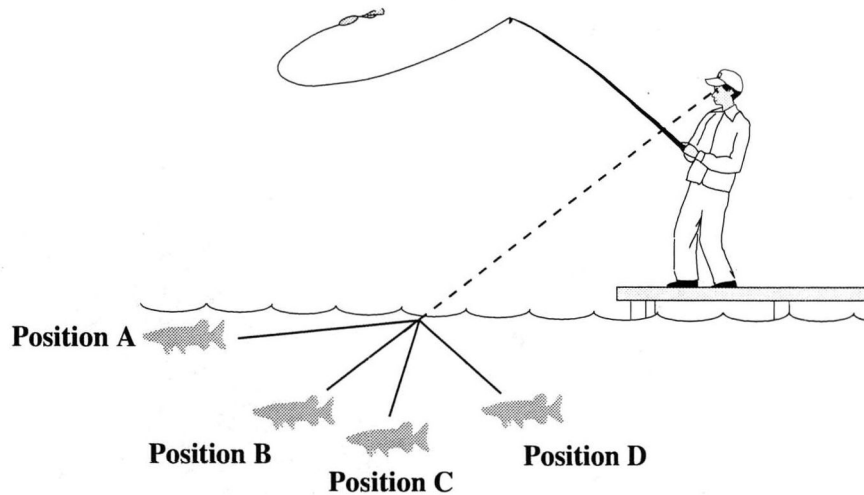
Mike and Rita went to the storage shed to get some camping supplies. Mike asked Rita why the power line was sagging.



2. Rita told Mike that she had observed that the length of the power-line wire changed from summer to winter. Rita explained that this is **probably** because the
- A. power-line wire contracts in winter
 - B. power-line wire contracts in summer
 - C. power poles sink in the ground
 - D. power poles expand when dry

Use the following information to answer question 3.

When Mike went fishing that afternoon, he saw a fish near the pier.



3. He knew that the actual position of that fish was

- A. position A
- B. position B
- C. position C
- D. position D

Use the following information to answer question 4.

In the local newspaper, Rita read about possible courses of action the people of the town could take to improve the environment:

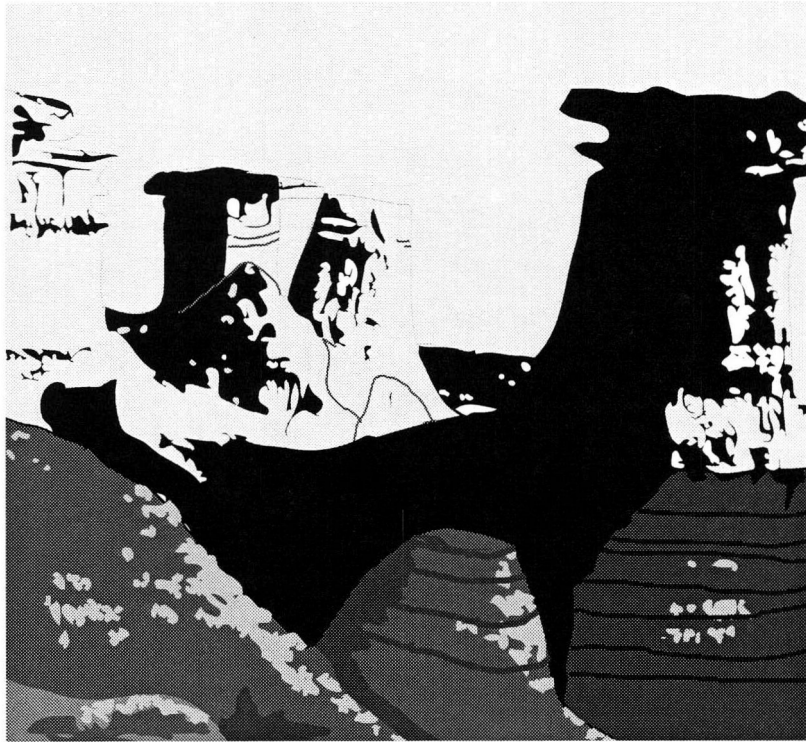
- buy products with little or no waste and little packaging
- buy products that can be used more than once
- decrease use of disposable items
- return materials for recycling
- compost organic wastes where possible

4. The newspaper article refers to people

- A. generating excess solid waste
- B. reacting to new laws in their community
- C. responding to changes in the environment
- D. being influenced by natural events

Use the following information to answer question 5.

The children and their grandfather camped near Drumheller, a very dry area in south-central Alberta. Grandfather took Rita and Mike to see the hoodoos, which are unusual rock formations.



5. Hoodoos are formed **mainly** by

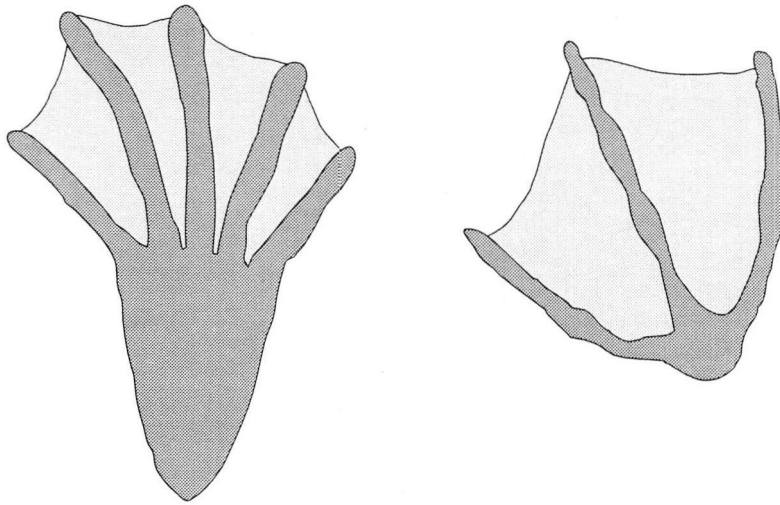
- A. wind
- B. sun
- C. snow
- D. cold

6. Rita observed an eagle soaring on air currents for a long period of time. She told Mike that the eagle's ability to soar is **best** suited for

- A. finding prey and keeping warm
- B. conserving energy and finding prey
- C. eating food and keeping warm
- D. conserving energy and eating food

Use the following information to answer question 7.

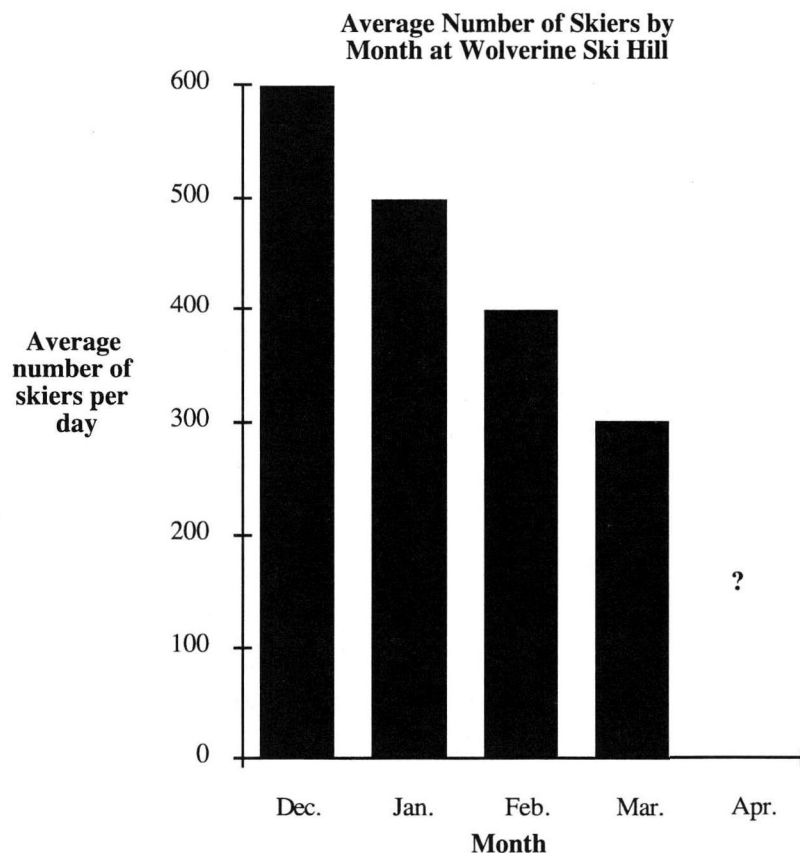
When they stopped for lunch, Rita and Mike went for a walk and observed these tracks:



7. Rita and Mike were probably in a
- A. forest area
 - B. mountain area
 - C. wetland area
 - D. grassland area
-
8. Mike and Rita went to the zoo, where they read the following facts about a particular insect: "The insect prefers high temperatures, moist conditions, and dim light." Marcus knew this insect would prefer
- A. an ocean beach
 - B. a tropical jungle
 - C. a northern forest
 - D. a prairie grassland

Use the following information to answer question 9.

Sam made this graph showing the average number of skiers at a ski hill per day for each month from December to March.



9. Sam wanted to predict the average number of skiers per day for April. Using the graph, the **best** prediction Sam could make would be
- A. 100 skiers
 - B. 120 skiers
 - C. 200 skiers
 - D. 300 skiers

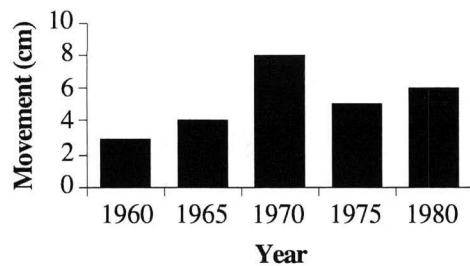
Use the following information to answer question 10.

One day, Mike and Rita visited the nature centre where they learned about a glacier. In 1955, an engineer started to keep track of how fast the glacier was moving. The engineer recorded the amount of movement once every five years.

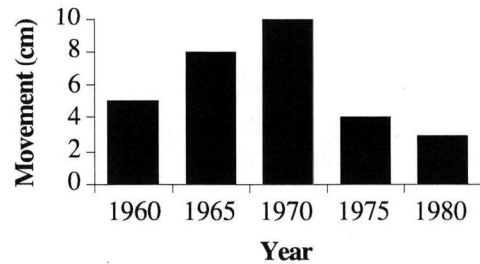
Year	Amount of movement
1955	Start of study
1960	3 cm
1965	4 cm
1970	10 cm
1975	8 cm
1980	5 cm

10. Which graph shows the data presented in the chart?

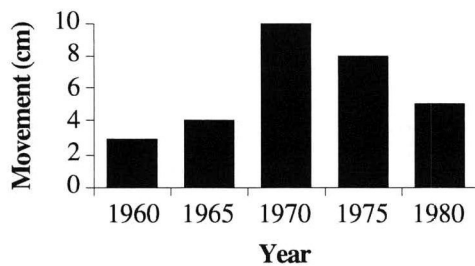
A.



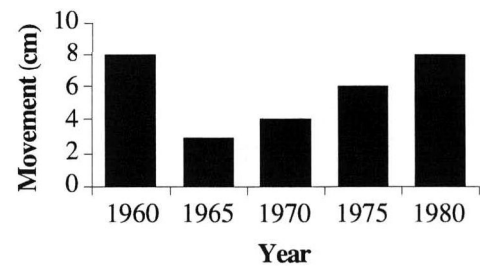
B.



C.



D.



Use the following information to answer question 11.

Early one morning, Rita filled her cup with water from a cold mountain stream. After 10 minutes, she observed water drops on the outside of the cup.

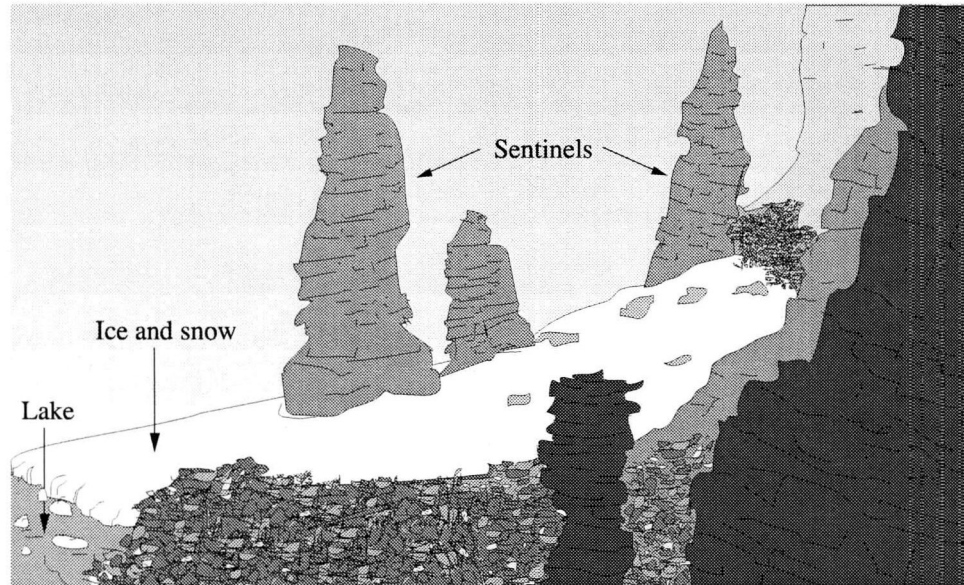


11. She commented to Mike that this demonstrates

- A.** the water cycle
- B.** water condensation
- C.** the heating of water
- D.** water evaporation

Use the following information to answer question 12.

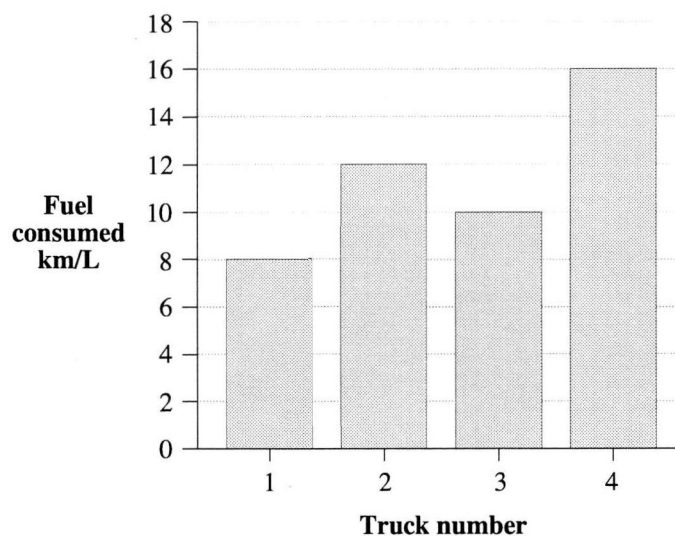
At the end of a day trip along a mountain trail, Mike and Rita saw these sentinel peaks near a lake and felt a cool wind moving down the mountain.



12. Rita thought about changes that will occur in this environment over the next five hundred years. From what can be observed in the above picture, the **best** prediction she could make is that the
- A. water level in the lake will rise
 - B. water level in the lake will drop
 - C. sentinel peaks will become higher
 - D. sentinel peaks will become lower

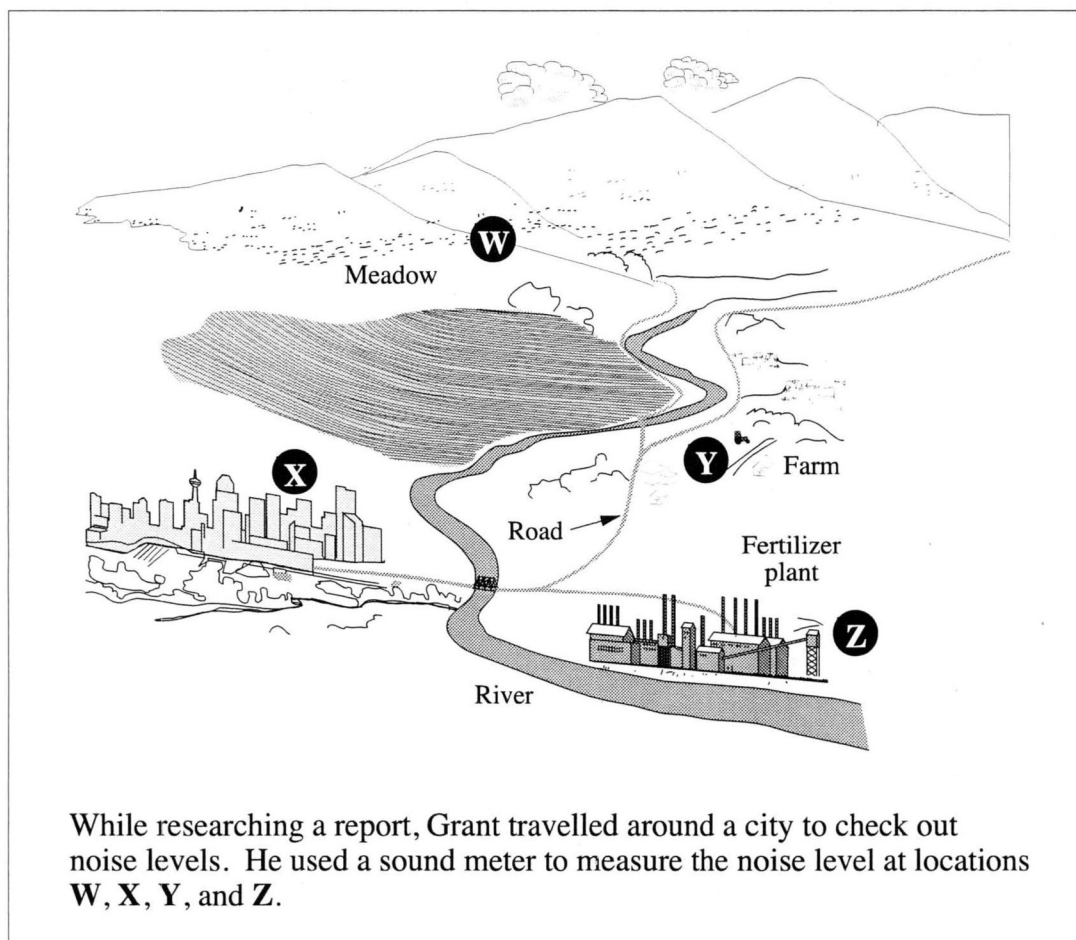
Use the following information to answer question 13.

Sally decided to find a way for her father's company to save money on delivery truck fuel. She kept a record of four different delivery trucks that use the same route. Sally made this graph to show her findings.



13. Sally looked at the graph and concluded that her father's company would save the **most** fuel by using **only** trucks
- A. 1 and 3
 - B. 2 and 4
 - C. 3 and 2
 - D. 4 and 1
-
14. The energy source that the trucks could use in the future that would add the **least** to air pollution is
- A. electricity
 - B. propane
 - C. gasoline
 - D. diesel

Use the following information to answer question 15.

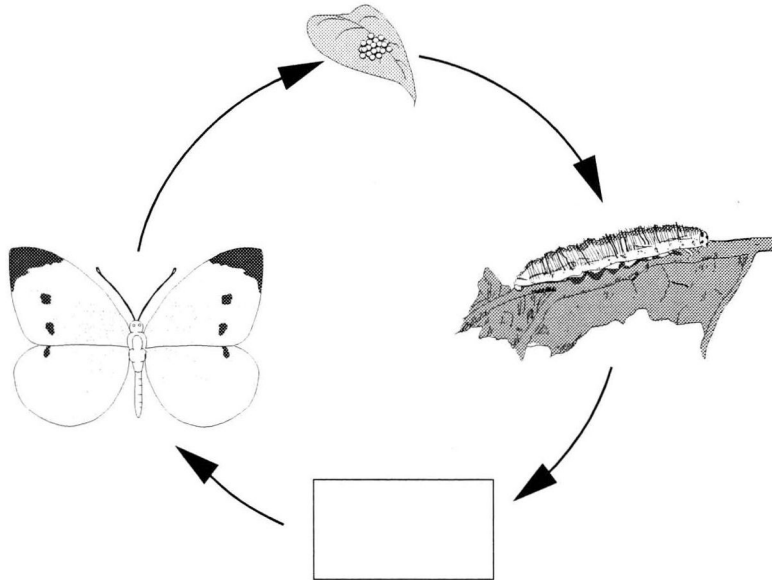


15. The noise level would probably be the **lowest** at location

- A. X
- B. W
- C. Z
- D. Y

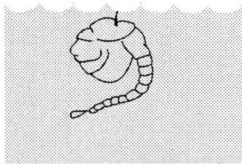
Use the following information to answer question 16.

Jane was working on a report about insect pests in the city. She knows that butterflies have four stages in their growth. In her garden, she saw three of the stages of a cabbage butterfly and made this diagram for the article.



16. To complete her diagram of the life cycle, Jane needs to draw a living thing that looks like

A.



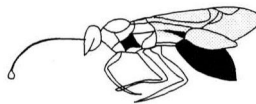
B.



C.

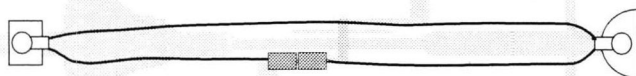


D.

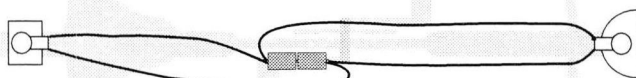


17. For safety reasons, Marcus and Jane wanted to make sure that they had working lights on their bikes when they cycled after dark. Marcus is testing four circuits. If one bulb burns out, in which circuit will the remaining bulb stay on?

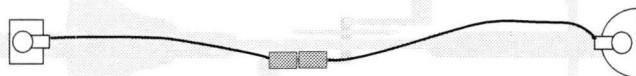
A.



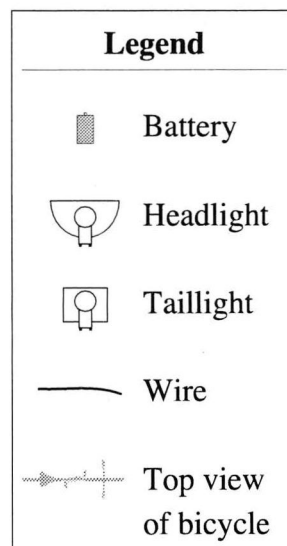
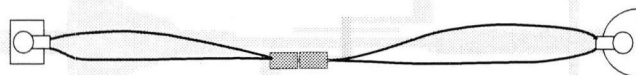
B.



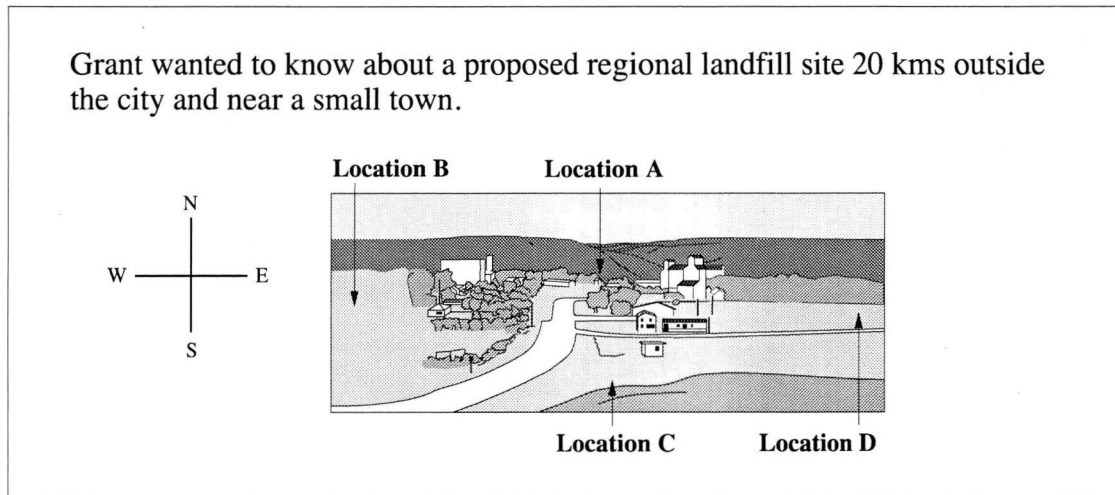
C.



D.



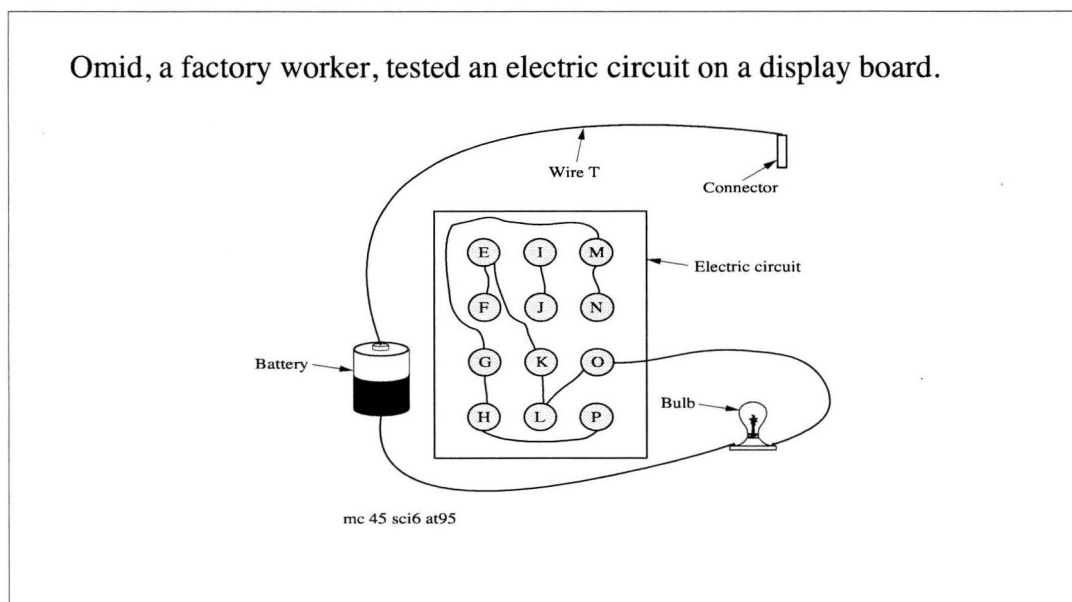
Use the following information to answer question 18.



18. The landfill site location that will result in the **lowest** odour level in the town is

- A. location A
- B. location B
- C. location C
- D. location D

Use the following information to answer question 19.



19. In order to light the bulb, Omid placed the connector on point

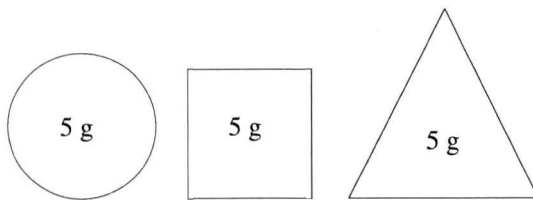
- A. J
- B. K
- C. P
- D. N

20. The factory makes chimes out of copper pipe. Sonja, an engineer at the factory, tested some chimes by hitting them with a hammer. The variable that she **most likely** changed to produce higher pitch or sound was the

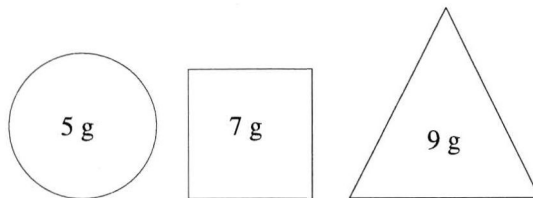
A. kind of metal
B. length of pipe
C. point of impact
D. type of hammer

21. Sonja needed to melt some aluminum. She decided to test whether shape affects the time it takes to melt a 5 g piece of aluminum. Which picture shows the pieces of aluminum she **most likely** used to do this test?

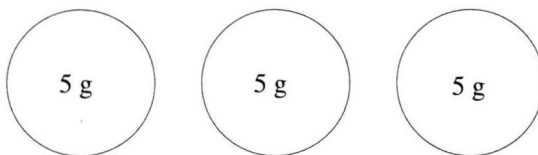
A.



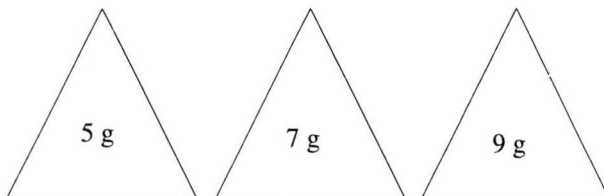
B.



C.

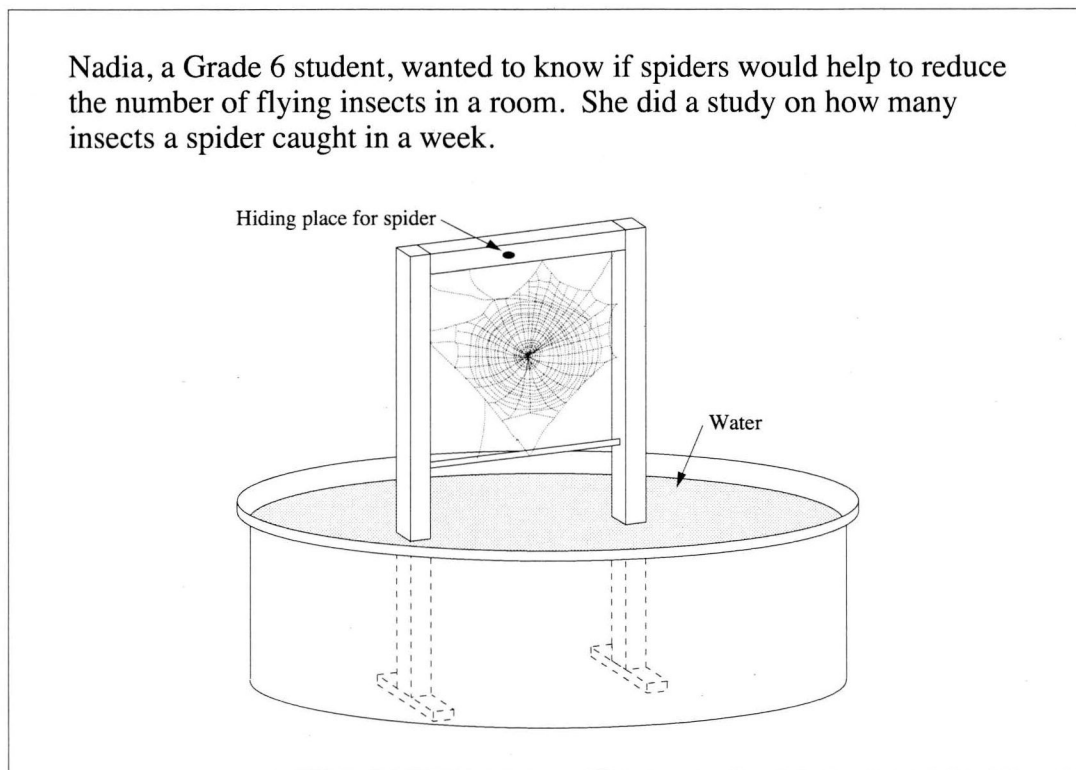


D.



22. Grant noticed that people working on electronic circuit boards had metal straps going from their wrists to the metal work table. The **most likely** reason for this is to
- A. keep workers close to their work
 - B. prevent people from dropping circuit boards
 - C. keep temperature and humidity controlled
 - D. prevent static electricity from damaging circuit boards

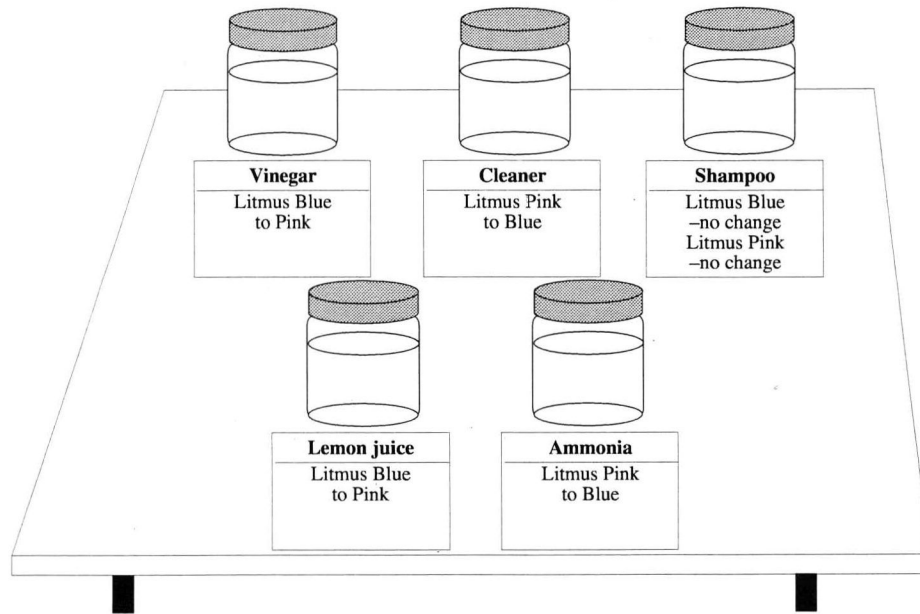
Use the following information to answer question 23.



23. Why did Nadia place the frame in a pan of water?
- A. To capture insects
 - B. To provide drinking water for the spider
 - C. To keep the stand upright
 - D. To prevent the spider from escaping

Use the following information to answer question 24.

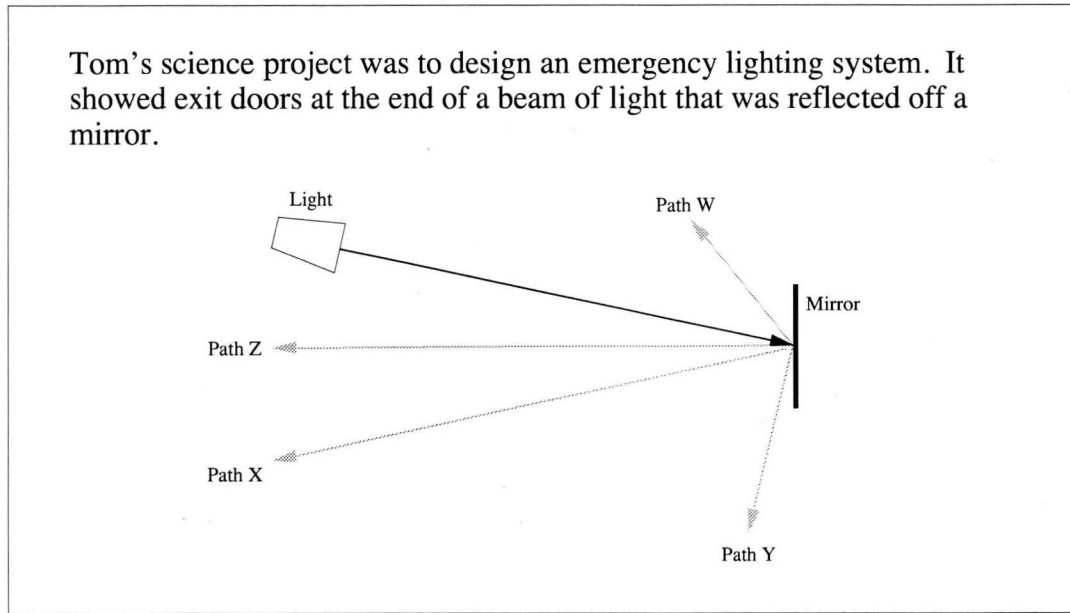
Kayla, another Grade 6 student, was concerned about the safe storage of acids and bases in her home. She knew that acids should not be stored with bases. She poured five household liquids into containers and tested the liquids with litmus paper.



24. The items she tested were

- A. all acids
- B. all bases
- C. neither acids nor bases
- D. mainly acids and bases

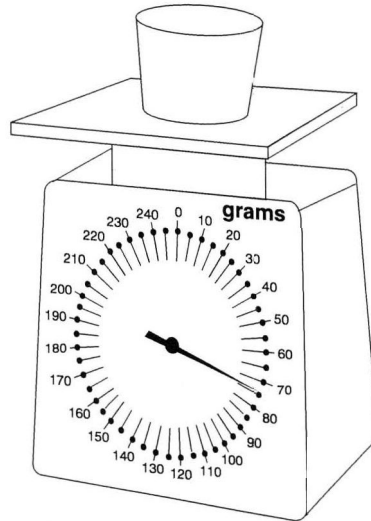
Use the following information to answer question 25.



25. When the light is turned on, what path will the light take?
- A. Path W
 - B. Path X
 - C. Path Y
 - D. Path Z
-
26. A park naturalist at a nature centre showed some children a record of temperatures over a particular time period. Which of the following temperatures are listed from **coldest** to **hottest**?
- A. -7°C , -2°C , 0°C , 3°C
 - B. -2°C , -7°C , 0°C , 3°C
 - C. 0°C , -2°C , 3°C , -7°C
 - D. 0°C , -7°C , -2°C , 3°C

Use the following information to answer question 27.

Tasha, a design engineer, collected 100 g of metal pellets used to make a figurine. The scale indicates the mass of the empty container she used to weigh the metal pellets.



27. After Tasha adds 100 g of metal pellets to the container, the needle on the scale will point to
- A. 72 g
 - B. 100 g
 - C. 174 g
 - D. 34 g

Key and Descriptors for Sample Questions

Ques.	Key	Topic	Learning Domain	Curriculum Standard	Assessment Standard*
1	D	Living Things and Environment	Knowledge	Recognize living components of an environment as producer, consumer, and decomposer	A
2	A	Matter and Energy	Skill	Infer that heat causes metal to expand	A
3	C	Matter and Energy	Skill	Predict the path of a light beam as it passes from air to water	E
4	C	Living Things and Environment	Knowledge	Identify possible causes of change in a particular system	A
5	A	Earth, Space, and Time	Knowledge	Know that wind erosion alters land forms	A
6	B	Living Things and Environment	Knowledge	Recognize plant and animal characteristics and their adaptive function	A
7	C	Living Things and Environment	Knowledge	Recognize structural adaptations	A
8	B	Living Things and Environment	Knowledge	Identify the habitat of an insect from information provided	A
9	C	Living Things and Environment	Skill	Predict from observing recorded data	A
10	C	Earth, Space, and Time	Knowledge	Select the graph that best represents a set of data	A
11	B	Earth, Space, and Time	Knowledge	Recognize the stages of the water cycle	A
12	D	Earth, Space, and Time	Skill	Hypothesize the long term changes in the Earth	E
13	B	Matter and Energy	Skill	Hypothesize from data presented in a graph	E
14	A	Matter and Energy	Knowledge	Recognize that electricity is an alternative energy source which produces little air pollution	A
15	B	Matter and Energy	Skill	Infer from a diagram the location where noise level will be lowest	A
16	C	Living Things and Environment	Knowledge	Identify different stages of animal life cycles	A
17	B	Matter and Energy	Knowledge	Recognize complete series and parallel circuits	A
18	D	Earth, Space, and Time	Skill	Predict a suitable landfill location from information presented	E
19	B	Matter and Energy	Skill	Infer the correct electric circuit	E
20	B	Matter and Energy	Skill	Infer control variables that cause changes in sound	A
21	A	Matter and Energy	Skill	Apply the experimental design needed to test the melting temperature of different shapes of metals	A
22	D	Matter and Energy	Skill	Infer that wire grounds static electricity	A
23	D	Living Things and Environment	Skill	Hypothesize possible reasons to account for the experimental design	E
24	D	Matter and Energy	Knowledge	Identify liquids as acids or bases, using the litmus test	E
25	B	Matter and Energy	Knowledge	Recognize the path of light when reflected off a mirror	A
26	A	Matter and Energy	Skill	Sequence on the basis of comparative measurement	A
27	C	Matter and Energy	Skill	Measure mass with the use of a scale	A

*A—Students meeting the acceptable standard should be able to correctly answer questions such as these.

E—In addition to answering the questions identified for the acceptable standard, students meeting the standard of excellence should be able to correctly answer questions such as these.

Credit

Donald H. Graves, *Build a Literate Classroom* (Toronto: Irwin Publishing, 1991), p. 183

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